

First evidence of the impact of climate change on Arctic Terns

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Data collected from electronic tags retrieved from 47 journeys made by the Farne Island Arctic Terns, has revealed for the first time how climate change might affect their behaviour.

Arctic Terns spend their breeding and non-breeding seasons in polar environments at opposite ends of the world and are our longest-migrating seabird.

Spending their non-breeding season in the Antarctic, the remoteness of this part of the world means that until now we have had a very limited understanding of their behaviour and distribution while they are there.

Analysing the data from 47 migrations over two study years, 2015 and 2017, the team found:

- Arctic Terns live on the Antarctic ice for one third of their annual lifecycle.
- Analysis of their feathers shows their main food source is krill or similar crustaceans.
- There were marked differences in the bird's behaviour and distribution between those

tagged in 2015 compared with those tagged in 2017. This coincided with a substantial change in ice conditions, with high ice cover in 2015 followed by unusually warm conditions which led to the break-up of the ice in late 2016 and lower ice cover than normal throughout the following year.

Dr. Chris Redfern, of Newcastle University, UK, who has led the study explained:

"Sea ice is an important habitat for juvenile krill as it provides protection from predators and from the intense light of the Antarctic summer.

"We now know that krill are the main food source for the Terns so it seems likely the warmer weather during 2016/2017 led to reduced krill abundance and so the birds were forced to forage in different areas.

"And in fact, in that second year, the birds converged on the Shackleton Ice Shelf rather than being spread out along the East Antarctica coastline.

"Polar regions are particularly sensitive to climate change and even small shifts can have major implications throughout the entire food web.

"This is why it is critical to understand how seabirds such as the Arctic Terns are affected by [environmental change](#), both short and long term."

Co-author Professor Richard Bevan, of Newcastle University, adds:

"In the course of this study, we have been continuously amazed by the incredible journeys that these seabirds make each year and now we are beginning to get a glimpse into what they are doing in their wintering areas in Antarctica.

"Arctic Terns are one of the few non-breeding birds

that are present in Antarctic waters during the summer. This means the birds are not constrained to a nest site but can move to where the best feeding sites are located.

"By following the journeys made by these birds, we can monitor changes in the location of these hot spots and get some insight into environmental changes that are taking place in these very remote locations; areas to which few scientists ever venture or monitor."

The data were collected as part of a landmark study led by Newcastle University in collaboration with the National Trust, BBC Springwatch and the Natural History Society of Northumbria.

The first data retrieved from the study highlighted the incredible journey travelled by these seabirds, with one flying an estimated 96,000Km (almost 60,000 miles) from its breeding grounds on the Farne Islands, off the Northumberland coast, to its winter quarters in Antarctica.

Mapping in unprecedented detail the route and stop-off points from the Farnes to Antarctica for the winter and back again to breed, the team tracked:

- An 8,000 km, 24-day, non-stop flight over the Indian Ocean, feeding on the move
- An overland detour from the Farne Islands to the Irish Sea and over Ireland to the Atlantic
- A short stay on the New Zealand coast before completing the final leg of their journey
- A stop-off at Llangorse Lake, in the Brecon Beacons National Park, during their return journey in the Spring

"The Arctic Tern's dependence on the ice throughout their non-breeding period in Antarctica highlights the vulnerability of the species to climate change," says Dr. Redfern.

"It is well known that Arctic Terns have relatively shorter legs than other tern species and in light of what we now know, this may be an adaptation to life associated with low temperatures—the freezing point of sea water is -1.8 C and the daily average

minimum temperatures recorded by the birds' data loggers was between 0 to -5 C.

"The trackers have given us a unique glimpse into the lives of these incredible birds, surviving against all the odds, and highlights how precarious their future is in the light of anthropogenic [climate change](#)."

More information: Chris P. F. Redfern et al, Use of sea ice by arctic terns *Sterna paradisaea* in Antarctica and impacts of climate change, *Journal of Avian Biology* (2019). [DOI: 10.1111/jav.02318](https://doi.org/10.1111/jav.02318)

Provided by Newcastle University

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